GARDEN AND FOREST.

PUBLISHED WEEKLY BY

THE GARDEN AND FOREST PUBLISHING CO.

Office: Tribune Building, New York.

Conducted by . . . . . Professor C. S. Sargent.

ENTERED AS SECOND-CLASS MATTER AT THE POST-OFFICE AT NEW YORK, N. Y.

NEW YORK, WEDNESDAY, AUGUST 14, 1895.

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Color in the Garden.

THE scheme of color in beds and borders is a problem which is seldom grappled with successfully. A combination of trees is sometimes as painful to the color-sense, owing to conflicting tones, as the jarring of scarlet Geraniums and purple Coleus. Refinement of perception in this direction is the final test of the true artistic gift in planting.

Even in small gardens it is possible to give a keynote of color by which to tone the whole, so that discordant hues may be excluded; but to control the effect one must be ever on guard lest Nature thrust in that shade of purple-pink which she evidently intended for a landscape in which green predominates, as in country roadsides and the edges of woods. Florists' colors do not always come true, and one is frequently dismayed at the development of this objectionable tint in flowers described as scarlet, so that one who weeds relentlessly may find unsightly gaps even in a well-planned border of gay perennials or annuals. Only an expert gardener can make complicated pattern-beds endurable, but it is not so difficult to make the simpler and more natural forms of gardening interesting on a small scale. Most beautiful effects are obtained with groups of flowers against a background of shrubbery, where they have the charm both of relief and of surprise. But it is not possible to combine with the roots of hungry shrubs those plants which require rich nurture to bring them to perfection, so that there are many lovely things that must be grown in open and sunny places, where they cannot be robbed of their nutriment. Generous beds, where they can be grouped in masses, are appropriate for these, and the plants should be so arranged that the different hues will melt into each other, rather than clash in harsh contrasts. Above all, what painters call a spotty effect should be avoided, and each color allowed enough space to make a definite impression on the eye before combining with the succeeding one. Nor should the lines of junction be sharply defined, but insensibly connect one with another, with here and there some touch of vivid contrast by way of emphasis.

It is said that all colors can be combined if the sense of true proportion be the guide, and that in this perception of proportion lies the true secret of the beauty of the oriental rugs. It is the same with a garden, where certain colors can more safely predominate than others, notably shades of red and yellow, with their infinite variations from deep velvety crimson to soft pink, and their rich blendings of hues of brown and gold and orange, as in the Nasturtium and Marigold and Chrysanthemum, from almost black to palest buff. Blue, which is always a painter's puzzle, must be cautiously employed in the garden, and always with careful reference to its relations with contrasting flowers. It should be used sparingly, and requires white and pale yellow in its neighborhood or a mass of surrounding foliage. The Iris, rising amid its lance-like leaves; the Forget-me-not, starring the lush meadow grass; the Succory, straggling in the dusty roadside herbage; the Harebell, nodding amid rock Ferns, are Nature's hints for the proper setting of this difficult color. Masses of tall shaded Larkspurs growing against a white veranda-rail, or a mass of Ascension Lilies, show well, and their tall spikes are very effective in the angle of steps going down from porch or terrace into a garden.

Purples and lilacs can be exquisitely mingled, as in the varied shades of Irises, and they combine well with pale foliage, and with white, but should be kept away from reds and pinks. Delicate yellow relieves them agreeably, and they are very charming in some cool damp nook, where they seem to be in harmony with the quiet scene.

In Robinson's *English Flower Garden* it is wisely recommended to have flowers of cool and delicate tints in shady borders; typical plants for which use are the tall Larkspur, Monkshood and Columbines, the Alpine and Japanese Anemones, Hepaticas, White Lilies, Trilliums, Primroses (white and yellow), Daffodils and Lily-of-the-valley. Behind these flowers of the dale the author would place "sombre masses of dusky shadow rather than positive green color." In sunny places he recommends warm colors, which are harmonized by the yellow sunlight, and suggests the grouping of Marigolds, Chrysanthemums and Nasturtiums, all shades of yellow, orange and brown—a combination which could readily be tried in the simplest garden.

It is often said that the reason for the prevalent planting of Coleus and Geraniums is their comparative cheapness, but a wealth of Marigolds and Nasturtiums can be procured for the cost of a few Geraniums, and a far wider range of color, both in depth and brilliancy, can be attained by their aid, to make gay a cottage garden or the terrace of a castle. Certain perennials of great splendor, such as the Oriental Poppy, the scarlet Phlox, the Sweet William, the Bee Balm, will give a succession of trumpet notes in a border for many months, and between the strong-growing roots can be set red Gladioli to blossom in August, and Shirley Poppies, which come early into brilliant and varied bloom in proper key with them; while the tones of Salvias and scarlet and crimson China Asters can be the final notes of a symphony which will last from May till October. Numerous are the lovely blossoms of the same tone which can be interspersed with these to vary the effect and shade into the properly ensuing rosy hues worn by so many fragrant and long-cherished flowers, Roses and Pinks, Balsams and Oxalis, Verbenas and Sweet Sultans, Foxgloves and Dahlias, Perennial Peas, pink Larkspurs and Canterbury Bells, and hundreds of others, with rose-colored Asters for the late season. These should be followed by a touch of white and cream color, leading to the pale yellows, which, though deeper and richer tones, conduct the eyes agreeably to the Iris and Ageratum, the lilac Phloxes and Campanulas, the Asters, which prolong the season and deepen into the richest purple. On the other side of the reds can be a transition, through pink and white and palest yellow, as the Evening Primrose, to the tender azure of the Myosotis and the more brilliant blue of early Scilla and Hyacinth to Linaria and Bluebells, ending with the intense indigo of Delphinium and Aconite. Low-growing plants, like Pansies and Portulaccas, in tones which harmonize with the state-

lier spikes and clusters of bloom, and which seem to cover the ground, can be interspersed among the taller ones, intermingled with plants whose foliage is of such shades as will accord well with the color of the flowers.

By careful study of the times of blossoming a glowing and harmonious effect can be produced at slight expense of money, though of much time and loving thought. A result, pleasing and varied, can be obtained in the tiny square of a cottage garden by grouping the humblest and least expensive flowers, and where there are broad spaces to be filled, with great frames of foliage to enhance the beauty of the scene, a picture can be painted by an artistic hand which will afford unfailing delight. These broad rules laid down do not exclude a happy contrast here and there, but it should always be remembered that contrasting colors should be of a similar key. Deep blues can be opposed by vivid cardinal or flame color, the cerulean tints by tender rose or pale yellow, purple by gold and green; but intense contrasts should be seldom indulged in, and require great discretion in their use.

It is far easier to theorize than to carry out one's theories, as all philosophers find to their cost, but the study of the color problem is one of unfailing interest to the gardener, and when it is successfully solved the result may truly be considered a triumph. The same problem confronts the landscape-gardener, and its difficulties have often been considered in these columns. Forms as well as tints are an essential feature to be dealt with in considering final effects, and to succeed perfectly requires an artist in line as well as in color. The true gift to discern is not given to all, but each according to his light should seek to give individual expression to his fancy.

Notes from a Botanic Garden.—II.

IN trying to grow certain plants the manager of the garden is constantly thwarted by drought, excessive rains, cold, sunshine, shade or by unsuitable soil, and is constantly sent back to marsh, ravine, sand, loam or clay bank to study the favorite location of each species, and with each such effort a few more plants are made to thrive in the garden. In this way we have learned to grow well many Ferns, Hepaticas, Cohosh, Violets, some of the Mints, Sedges and Grasses, while Golden Seal we now grow to perfection. We are still experimenting on Columbo, Dwarf Thistle, Harbinger of Spring, some Gentians, Houstonia and many more.

Perhaps it was fifteen years ago that we received Solanum tuberosum from the Harvard Botanic Garden. It was said to be a fresh arrival from Mexico. After a few years, instead of tubers an inch or less in diameter, we grew some three inches long. For ten years, perhaps, we have been growing S. Jamesii, from Arizona. For the past three years more especially some of the tubers have nearly doubled in size, while the outside has changed from the brown, warty surface to a clear color resembling our smoothest potatoes in general cultivation.

In most cases, by selecting a spot of suitable size especially favorable for the plants of a given family, we are enabled to keep them near each other, but no attempt is made to plant allied families next to each other or to arrange species in an artistic manner. In the Calla or Arum family, for example, the Sweet Flag, Golden Club, Wild Calla and Arrow Arum are grown in the mud in shallow water, and just on the adjacent bank are grown Indian Turnip, Green Dragon and Skunk Cabbage. On a small inaccessible island we grow Poison Sumach and Poison Ivy, while on the neighboring bank are six other species of Rhus. The Ferns are on the north side of a moist bank and at the base of it, more or less shaded by trees and protected from winds. In a large space sunk a foot into the black soil of the creek-bottom Cardinal-flowers grow to perfection, while a mound near by is well covered by a group of Harebells. Among the Geraniums, a depression is made extending to a soil perpetually wet, and here they find a congenial home. So with the Marsh Marigold, some of the Sedges, a patch of Holly Grass and some species of Glyceria; and for the Heath family, a depression in the muck grows two sorts of Cranberries, several sorts of Huckleberries, the Leatherleaf, a species of Kalmia, and Labrador Tea, while those needing drier soil are near at hand.

Near one of the ponds, and on a bog about twenty-five by forty feet, we are experimenting. The space is nearly enclosed by Arbor-vitæ or a temporary artificial screen to prevent any sweep of air and to keep out the sun, while raised on posts ten feet high is a screen of slats to check the force of the sun from above. Here we are growing Mosses from the swamp, including other things found in such places. Calypso borealis has flowered here for two years in succession. It is too soon to pronounce it a success in every particular.

Some plants, like Violets and Euphorbias, as their pistils ripen, shoot seeds in every direction, often from three to eight feet. On this account we scatter the roots of Violets around among the crucifers, and must scatter the Euphorbias to prevent hopeless confusion of seedling plants. Root-stocks of Arrow-head, Juncus, Bur Reed, Cat-tail Flag, Scouring Rush and others spread so rapidly in the ponds and bogs that they soon become mixed. We are planning now to give each species with this habit a small bog to itself, where nothing can intrude and where it can hold full sway. In the fall of the year the large terminal buds of Myriophyllum and Bladderwort sever themselves from the parent plant and sink to the bottom to rise the next spring and drift away from home, starting many new colonies. We hope to provide for keeping these plants within bounds in a similar way.

In the place where we wished to grow the Mints, Pulse family and a few others the ground was rather too hard. We covered the soil with about six inches of sand, which serves as a mulch and works easily. We have a dry sand bank sloping to the south which grows species of Sedum, Cacti, Tanacetum Huronense, Solidago rigida and a few other things to perfection. We are doing pretty well with species of Gooseberries and Currants, Sedges, Viburnums Hawthorns, Willows, Honeysuckles, Compositæ, Grasses, and weeds. We grow the last two lots in a formal way, each occupying about five by six feet, with a narrow grass path between.

In the older portion of the garden the paths consist of a little gravel and loam, with borders of small field stones; in the newer portion the paths consist of well-mown grass. All weeds of much size, if any are found, are carried away to the rubbish-pile. In this way, after about three years, all those which are troublesome come from seeds of plants in cultivation.

By doing much of the spring work the fall previous, such as transplanting, weeding, etc., one man with a little help tends the whole three acres alone, and this without any opportunity to use a horse-cultivator.

Agricultural College, Michigan. *W. J. Beal.*

Foreign Correspondence.

London Letter.

Crinum Roozenianum.—This was described as a new species by Mr. J. O'Brien in 1891 (*Gardeners' Chronicle*, ix., p. 701), when it flowered in the rich collection of Sir C. Strickland, at Malton, in Yorkshire. It was introduced from Jamaica by Messrs. A. Roozen & Son, of Haarlem. A plant of it is now in flower in the Palm-house at Kew, and by its side, also in flower, are plants recently brought from Jamaica by Mr. A. Worsley, who proposed for it the name of Crinum Jamesense, suggesting at the same time that it might be a white form of C. erubescens, which is common in tropical America. Mr. Baker says it is the C. erubescens, var. minus, of Herbert, a bad name for it anyhow, as it is the most robust and handsomest in flower

of any C. erubescens known to me. The largest of the Kew plants has about a dozen stout leaves nearly a yard long and four inches wide; a stout erect scape two feet long, bearing an umbel of eight flowers, all open together; tube seven inches, segments five inches long, the latter three-quarters of an inch wide, spreading and recurved, pure white; filaments curved upward three inches long, crimson; anthers yellow, odor very powerful and fragrant. The plant produces offsets very freely.

HIPPEASTRUM BRACHYANDRUM.—Permit me to again call the attention of those of your readers interested in bulbous plants to the merits of this comparatively new and, as yet, scarcely known Amaryllid. It is now established in a cold frame at Kew, where it grows and flowers freely, produces offsets abundantly and ripens seeds every year. It is now flowering, its scapes being a foot long, each bearing a trumpet-shaped flower not unlike a Belladonna Lily in form and color, but a little less in size. A batch of seedlings shows flowers in which the blackish red blotch at the base, characteristic of the type, is absent, the base of the segments being green. This may be taken as evidence that the plant is likely to "sport" under cultivation. There is a figure of the type in the *Botanical Magazine*, t. 7344. It is a native of Buenos Ayres. In places where the Belladonna can be grown out-of-doors it would be quite at home; indeed, it lived through the winter of 1892-93 in a border against a south wall at Kew, but the following winter proved fatal to it. In general behavior it may be likened to another and much older, but horticulturally neglected bulbous plant, namely, Zephyranthes carinata, which thrives under the same treatment as suits the Hippeastrum.

IRIS HARTWEGII.—Mr. Gerard may be interested in hearing what progress has been made at Kew with this species (see p. 287), of which he sent fresh seeds in December last. They were sown at once in a pan of loamy soil in a stove, and as soon as the seedlings were strong enough they were pricked off into other pans and then gradually hardened off. In May they were planted in a bed of rich soil in a frame facing south, and since June they have been left exposed to sun, air and rain, night and day, being supplied with water in dry weather. They are now healthy plants, each having about half a dozen leaves fifteen inches long, and a tuft of long fleshy white roots, suggestive of strong Asparagus crowns. Nothing could be happier or more promising, although the treatment so far has been the reverse of that described by Mr. Gerard. The Kew plants ought to flower next year.

MYOSOTIDIUM NOBILE.—The best specimens I have ever seen of this interesting Boragewort from the Chatham Islands, near New Zealand, were in the garden of Mr. Enys, at Enys, Penryn, Cornwall, where the conditions appear to suit it exactly. It has been a specialty in the garden of Sir E. Loder, at Horsham, for some years, and I believe it flourishes in the open air in Mr. Gumbleton's garden in Queenstown. It first flowered in England about forty years ago, but it has never become a general favorite among growers of herbaceous plants because of its miffiness. It has a thick prostrate root-stock, a tuft of glossy green heart-shaped leaves about nine inches in diameter on stalks about a foot long. The flowers, which are borne in a loose corymb on an erect scape a foot long are nearly as large as common Primroses, and colored two shades of blue. Flowering plants can be grown in two years from seeds. Mr. Enys writes: "I have succeeded with this plant by growing it in the open air under a south wall, planting it about a foot deep in sea sand and covering it with mats in winter. Thus treated it produces leaves a foot across and just short of three feet in height, with large heads of flowers. It ripens seeds abundantly here. I saw it growing in pure sand in the Chathams."

CAMPANULA VIDALII.—When well managed this is one of the very best plants for the conservatory. Mr. Poë, an amateur, who devotes his garden chiefly to the cultivation of uncommon, but attractive, plants—neglected beauties, one might call them—exhibited this week a group of examples of this Campanula, which secured a first-class certificate and the admiration of all who saw them at the exhibition. They were in nine-inch pots, the stem about a foot high, with a head of horizontal branches clothed with glossy green foliage, and the flower-scapes were a yard high, each plant having about six scapes, and each scape bearing about a score of pure white waxy-looking bells which hung gracefully from near the top. To manage it properly, this Campanula must be raised from seeds and grown on year after year; cuttings never make nice specimens. When about four years old the plants are at their best. The branches of this year develop into the flower-scapes of next, a new set of branches springing from the top of the stem every year. The plants will not bear frost. This species is remarkable in being found wild only in the Azores. It has been in cultivation about forty years.

CLERODENDRONS.—Mr. Orpet inquires (see page 288) if there is a Clerodendron in English gardens which answers to the description of the plant he knew fifteen years ago as C. squamatum, and which was a stove climber, with dark green leaves and bright red flowers produced in winter. No doubt, the plant meant is C. splendens, which was introduced from Sierra Leone about forty years ago. It is in flower at the present time in a stove at Kew; indeed, it is rarely without flowers at any time of year. The panicles are from six inches to a foot across, and the flowers are of a rich blood-crimson color. A hybrid between this species and C. Thomsonæ (Balfourii) was raised about twenty-five years ago and distributed by Mr. W. Bull. It differs from both parents in having the calyx colored dull red and the corolla of a deep crimson color, and, although not as effective as either, it is, nevertheless, a good, free-flowering, attractive stove climber. There are fine examples of it in flower now trained against the rafters in the stove at Kew. I have seen this plant doing duty for C. splendens. The other plant referred to by Mr. Orpet—namely, C. squamatum—is our old friend, C. Kæmpferi, under another name. It is one of the most useful of stove plants, being easily grown in pots, and with a little management it may be had in flower all the year round. We grow it from spring-struck cuttings in a sunny frame during the summer, removing it into a warm house in October, when it flowers all through the winter, odd plants flowering at other times. It is a native of various parts of India as well as China and Japan, and is one of the most widely cultivated of garden-plants.

London. *W. Watson.*

Entomological.

Another Herbarium Pest (Ephestia interpunctella).

IN the early part of the present century the naturalist Hübner published, in his *Sammlung europäischen Schmetterlinge*, a description of a little moth under the name of Tinea interpunctella. This insect does not appear to have been noticed or to have attracted any attention in this country until about forty years ago. In his *Second Report of the Insects of New York*, published in 1856, page 320, Dr. Asa Fitch described the insect as a new species under the name of Tinea zeæ, or Indian Meal Moth, and he stated that its larva was particularly troublesome to housewives by destroying the cakes used in starting fermentation in dough, these cakes being largely composed of Indian meal. It proved to be the same species described by Hübner, by more recent entomologists classed under the genus Ephestia, or sometimes under Plodia. It may have been introduced from Europe, although this is by no means clear, as it is known to have a wide distribution on this continent. Four years after the description by Fitch, the late Brackenridge Clemens, in the *Proceedings of the Academy of Natural Sciences of Philadelphia*, 1860, p. 206, stated that the larva was a frequent inhabitant of houses and "feeds on a variety of dry goods, rye, corn, clover seed, on garlic heads, preserves, especially those

contained in jars. The seeds are bound together with a silken web in which galleries are left."

The late B. D. Walsh, in the *Practical Entomologist*, vol. ii., July, 1867, p. 110, calls it the Peach Worm, and says that dried peaches are often so much infested as to become worthless. His observation of it was probably made in Illinois, where he then lived. He also states that the larva was considerably preyed upon by a small Ichneumon-fly and by Chelifer oblongus, Say, a small scorpion-like spider.

In the *American Entomologist and Botanist* for December, 1870, p. 374, Professor C. V. Riley notes that a correspondent in Springfield, Illinois, found the larvæ living in old beehives and eating bee-bread and detritus, and also observes that the insect has been bred from dried roots of Dandelion.

In 1880, the same author, in the *American Entomologist*, vol. iii., p. 229, answers inquiry and specimens received from West Boylston, Massachusetts, where the larvæ were found in a sack used to hold oats, corn, meal and "shorts." In his answer, Professor Riley says: "This worm is almost omnivorous and feeds with equal relish on all sorts of dried animal and vegetable substances, being, however, particularly fond of grains and fruits. We have found it quite injurious to old English walnuts and pecans, the larva always eating out at the suture at the base of the nut before spinning its cocoon. It is likewise to be found in cinnamon bark, while if it once gets into a cabinet of insects it does much injury by feeding upon the mounted specimens. It also injures old books that are not often handled. It cannot, of course, multiply in grain or meal that is kept well protected and fresh, or in sacks that are in constant use." In *Insect Life*, vol. ii. (1889), p. 171, Professor Riley gives the figure which is reproduced on this page, and says of the insect: "We first raised it upon wheat at St. Louis, in October, 1870. Larvæ have been sent to us from a meal-sack at Boylston, Massachusetts; we have reared it from corn from Guatemala; larvæ and moths were received from a firm of manufacturing chemists of Detroit, Michigan, who had found them crawling about over sacks containing roots of Dandelion—moths, in fact, being found in the bags; we found numerous larvæ infesting wheat in the Atlanta Exposition building in 1884; large numbers of larvæ were also found in a jar containing Chickasaw plums at the same exposition; larvæ were received from Ripley, Mississippi, on two occasions in 1885, some of which were said to have been found feeding on sugar in barrels; one specimen was bred from dry Opuntia from Texas; larvæ were received from Detroit, found among old books; larvæ of all sizes were found infesting Pecan nuts in St. Louis, in September, 1872; moths were bred by Dr. A. W. Hofmeister, in Iowa, from cinnamon bark; moths were bred from English walnuts in St. Louis in 1876, and the species in all states was found abundantly in a wheat warehouse in Alexandria, Virginia, in 1883."

It has been found infesting stored seeds of Lettuce in New Jersey, and at the Arnold Arboretum it has been destructive to the dried seeds of many trees and shrubs. From the foregoing records of its habits it is not strange to find Ephestia interpunctella in the rôle of a herbarium pest. During the past three years the larvæ have been quite troublesome among dried herbarium specimens, particularly among the duplicates, at the Arnold Arboretum. The flowers and fruits are especially liable to damage, and are sometimes completely eaten, excepting the very hard or stony parts, and young leaves are also often destroyed. If, on drying, such fruits as nuts crack a little, the larvæ easily gain entrance and eat out the interior. Thus far the pest has chiefly troubled the dry fruits and unprotected duplicates of herbarium specimens, and the evidence of its ability to destroy has been so well marked as to induce precautions for protection and preservation. Herbarium specimens treated with a solution of corrosive sublimate do not appear to have been much affected by the pest, but further experience must be had before it can be proved that this remedy is as useful against the Ephestia as it is esteemed to be in preventing the ravages of other kinds of herbarium depredators.

The larva or worm is of a pale or dull white color and about half an inch long when fully grown. It has a brownish yellow head and brownish patch close behind it, and the body is dotted with microscopically minute dark-colored spots, from each of which arises a hair. A more or less abundant mass of silken threads is usually spun among the fragments of grains or other substance upon which the larvæ have been feeding. Upon attaining full growth the larva forms a slight loose cocoon of dull white silk, generally in such places as in the folds of cloth, between contiguous objects or in any place where some slight concealment or shelter is afforded, and where it changes to a slender pale yellowish or brownish yellow chrysalis from one-fourth to one-third of an inch long.

The little moth which comes from this chrysalis is a slippery little creature, which, when walking, makes frequent little skips or jumps, and when at rest with folded wings it averages about three-eighths of an inch in length from head to tip of wings. The wings expand from about half an inch to nearly two-thirds of an inch across when fully expanded, there being a noticeable variation in the size of the moths. The moth may be readily identified by the basal or inner ends of its front or upper wings being of a yellowish white or dull cream color, while the outer ends for considerably more than half the length of the wings are of an indistinct reddish gray, a magnifier showing some irregular blotches of a dull tawny yellow color.

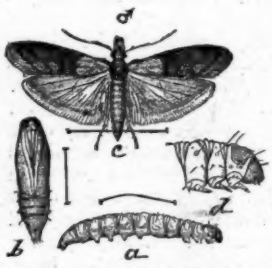

Fig. 45.—Ephestia interpunctella.

a. Larva. *b*. Pupa. *c*. Moth. *d*. Head and thoracic joints of larva, all enlarged.

The hind or under wings are white, with a somewhat satiny glossy lustre. There appear to be two or three broods of this insect during a single season, and the broods seem to overlap more or less. In a warmed room the moths may be found flying as early as February, and from this time onward throughout the spring and summer individuals may be found at almost any time, but, of course, in greatest abundance at the periods when the majority of the moths of each brood are developed, these seasons apparently being about the months of May, August and October.

Benzine or naphtha applied with a small hand syringe or sprinkler will kill every larva with which it comes in contact, and it possesses the advantage of evaporating quickly and leaving no discoloration. An interesting little ichneumon, Habrobracon honestor, has been found parasitic upon the larvæ.

The accompanying illustration is from a cut loaned by the Department of Agriculture.

Arnold Arboretum. *J. G. Jack.*

New or Little-known Plants.

Opuntia fulgida.

OPUNTIA FULGIDA, generally known throughout the south-west under the name Cholla, is one of the most interesting plants on the Tucson plains. This remarkable Cactus evidently reaches its greatest development in southern Arizona, where it not infrequently attains a height of fifteen feet, with a trunk from eight to twelve inches in diameter. (See figure, page 325.) It is strictly a plains plant, being seldom seen on the foot-hills or mountains. In Arizona its range extends as far north as the great rim which separates the Colorado plateau from the southern plains, and from here it extends southward deep into Mexico. In this territory it is confined almost entirely to Pima, Maricopa and Pinal coun-

ties. To the south-west, in Cochise County, its place is taken by O. Bigelovii, a somewhat similar, but usually much smaller, plant, which is also known under the name Cholla. To the north and north-west it gives way to O. Whipplei, which is the only cylindrical Opuntia found in Arizona, to any great extent, on the Colorado plateau. To the west, in Yuma County, it is no longer found, but in its stead we find O. echinocarpa.

Opuntia arborescens, a tree of much wider dissemination, and the small O. leptocaulis grow throughout the entire country occupied by O. fulgida. O. arbuscula, O. acanthocarpa and occasionally large numbers of O. Bigelovii are found mingled with this plant north and immediately south of the Salt and Gila rivers, while in the foot-hills and mountains throughout the south and central portions of its range are found O. versicolor* and O. mamillata.

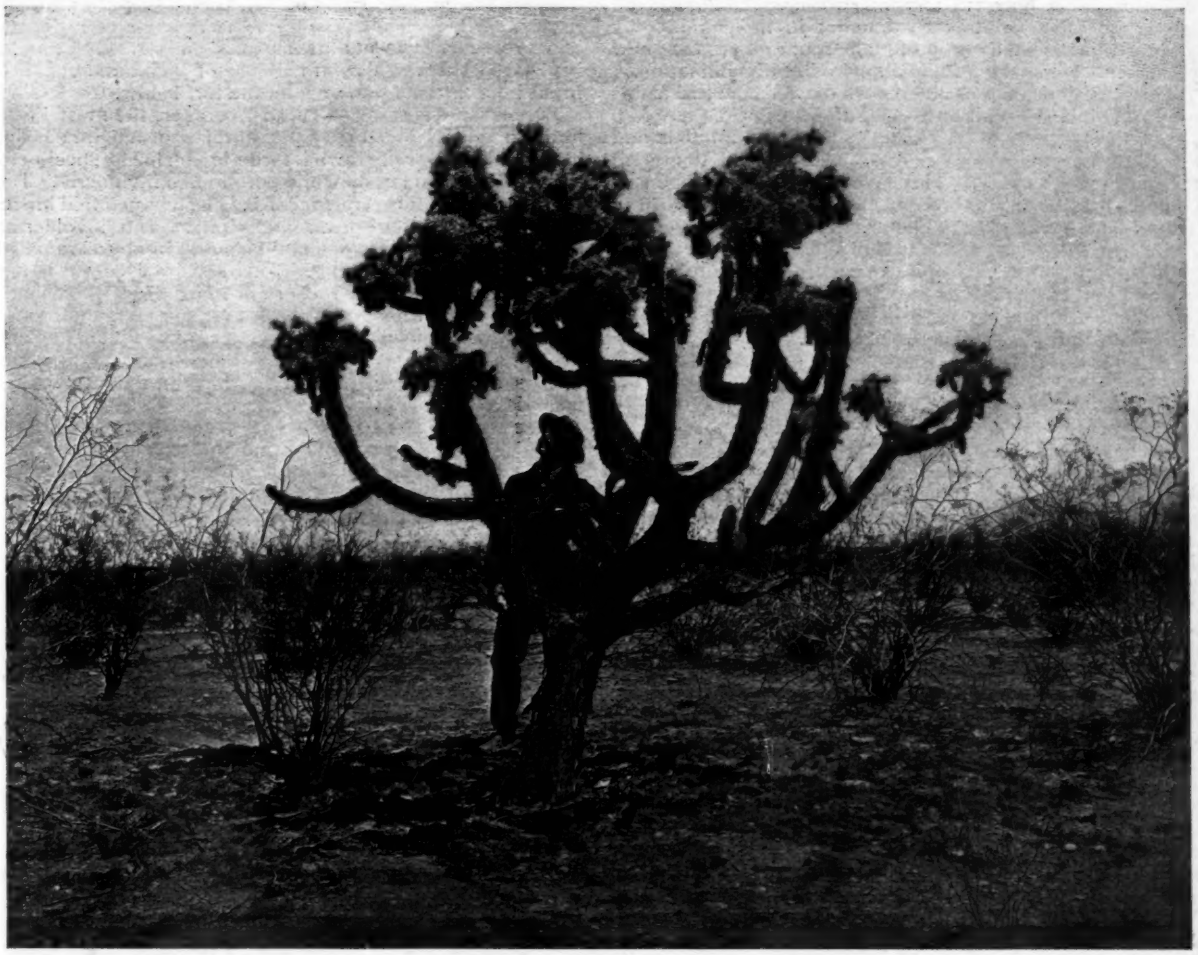

Fig. 46.—Opuntia fulgida in Arizona.—See page 324.

Opuntia mamillata is closely related to O. fulgida, and I seriously question whether it is separable from it as a valid species. It was described from material collected south of the Baboquivari Mountains, in the direct range of O. fulgida, and in the original description the characters apply almost equally as well to the latter species. The typical O. mamillata grows on low mountains, foot-hills and higher elevations than O. fulgida, which is characteristic of the open plains. The plains south of the Baboquivari Mountains and to the east, along the Mexican border, are more broken and considerably higher than the Tucson plains, which probably accounts for its presence there. It grows in great numbers on the southern foot-hills of the Santa Catalina Mountains, while a few miles farther south, across the Rilitto River, on the open plains, are growing the finest specimens of O. fulgida that I have ever seen. Last fall I made an extended examination of these plants, and traced all the variations to be found in a trip from the plains into the foot-hills. Although the two forms appear quite different in the different localities, where they intermingle it is out of the question to separate them. The flowers of both are of the same size, appear during July and August, and are the latest of the cylindrical Opuntias to bloom. The petals of both are bright pink, fading to purple; few in number and strongly deflexed. The deflexion of the petals is a character, so far as I have observed, common to but one other species of the cylindrical Opuntias found in Arizona—O. leptocaulis. †

The fruit of the plains plant is a little more spherical than that common to the typical Opuntia mamillata, and the tubercles are a little more prominent. These characters are by no means constant and of no value in establishing a specific distinction. In both the fruit is very proliferous, does not ripen until the following spring, and frequently

* This is a manuscript name of Dr. Engelmann's, which was never published. It represents a valid species growing in abundance on the low mountains of southern Arizona.

† In vol. vi., *Botany of the Wheeler Survey*, page 132, it is stated that the flowers of this plant, like those of the rest of the genus, are diurnal. So far as this plant in Arizona is concerned, this statement is denied. The flowers open about four o'clock in the afternoon and close shortly after sunrise the next morning.

remains hanging to plants until midsummer. Ripe fruit and flowers are frequently seen on a plant at the same time, this being true of quite a number of our cylindrical Opuntias; O. versicolor sometimes retains its fruit for two years or even longer. In both the proliferous fruit hangs in large pendulous clusters from the extremity of the branches. Many of these fruits, more especially those which develop from the tubercles of other fruits, are sterile, or have but few seeds. They are easily detached, and when they fall to the ground the moisture in them is sufficient to enable them to take root and in time form a new plant. The twenty or less small pulvilli on the ovary bear a few scattered spines, which usually fall off as the fruit matures. The young joints are easily broken off and cling like formidable burrs to anything with which they come in contact. The joints carried about in this manner by various animals finally drop off, take root and produce new plants, this being the principal method of dissemination.

The most conspicuous differences between the two plants are in the relative plumpness and diameter of the terminal joints, the tumidity of the tubercles, and the number and length of the spines—differences which depend to a great measure upon locality. Three years ago a specimen of Opuntia mamillata was brought from the foot-hills north of Tucson and set out in the Cactus garden at the university. Each year this plant more nearly approaches the plains plant in appearance; the spines are becoming more numerous and longer, the joints smaller and the tubercles less prominent. From my observations I conclude that O. mamillata is at most but a variety of O. fulgida.

University of Arizona. *J. W. Toumey.*

Plant Notes.

Sophora Japonica.—The few well-grown specimens of this tree now in flower in Central Park attract much attention, partly due to the fact that no other good-sized trees are in bloom at this late season, but their abundant, cream-colored, pea-shaped flowers would be striking at any time. These flowers, which are produced in loose panicles at the ends of the branches, are not as large as those of the Clammy Locust, but they continue to open for two or three weeks. This late production of abundant and lasting flowers is only one of the merits of this tree, however. It is perfectly hardy in all our north-eastern states, although it does not ripen seed. In form it has a broad, round head, and the dark green color of its younger branches also adds to its effective appearance. When grown in a well-drained, rich soil, its foliage is a deep lustrous green, and it remains on the tree looking clean and fresh until late autumn. In an early volume of Garden and Forest, Mr. Nicholson described a specimen of this tree at Kew, which was one of the three or four plants first brought into England. It is fifty feet high, with a spread of seventy-five feet and a trunk circumference of nearly fourteen feet. The specimen in Syon Park, as described and figured by Loudon, is still larger. None of the trees in this country, so far as we know, have reached this size, but there are many good specimens still growing, and it is one of the peculiarities of the tree that the older it gets the more floriferous it is. Altogether, it is one of the very best of medium-sized exotic trees for ornamental planting in this country. In spite of its specific name, this Sophora is really a Chinese tree which has been introduced into Japan, where it was first found by European botanists, and from which country it has been distributed among the parks and gardens of the western world. There is a weeping form of the species which grows into very picturesque shapes.

Rhus copallina.—This is the so-called Dwarf Sumach, one of the commonest of our native shrubs, sometimes hardly more than a foot high, and again, in richer soil, eight or ten times as tall, while in southern Arkansas and Texas it becomes a tree thirty feet high, with a trunk diameter of ten inches. It is flowering now, considerably later than the Smooth Sumach, which was preceded in bloom by the Stag-horn Sumach. Neither the flowers nor fruit are as conspicuous as those of the Stag-horn Sumach, but the male flowers continue to open in succession for three or four weeks, and long after those of the fertile plant have fallen. The fruit ripens to a dull red in autumn, and sometimes to a bright crimson. The chief beauty of the plant, however, is its graceful habit, and more especially its bright glossy foliage. The leaflets and the wing-margined stalk have more substance than those of the other species of this section of the genus, and, unlike them, they are a lustrous dark green on the upper surface. In autumn they change to a deep crimson color, which is retained for a long time. These plants add much to the beauty of rural roadsides, and they could often be used with striking effect in parks and private grounds. In Glen Island, a pleasure resort near this city, where there is a large collection of well-grown tropical and other plants, an interesting feature is a mass of these plants at the base of a cliff and connecting it in an attractive way with the turf below.

Euphorbia corollata.—This is, perhaps, the most beautiful of the numerous hardy Euphorbias, of a light, elegant habit, and when well grown it forms broad, bushy specimens covered with numerous white corolla-like involucres. The flowers are apetalous and greenish. The five petaloid bracts are about a quarter of an inch long. The involucrate flowers are very numerous and disposed in large-branched and somewhat leafy cymes. This species is quite hardy and will grow well in a rockery or in a border of ordinary soil. It flowers throughout the hottest summer months and is one of the most valuable hardy perennials for hot and dry positions. It is also useful when cut to mix with other flowers and adds an element of lightness and grace which is most desirable.

Dracæna Sanderiana.—This is a very distinct and remarkable form with erect leafy stems and lanceolate, rather short, leaves. In habit it is quite unique among the numerous species of Dracæna. The leaves are about four inches long, of a glaucous-green, edged and striped with broad bands of milky white. It has a tendency to grow very tall, but comparatively compact specimens with two or three stems can easily be grown. If the tops are removed as soon as the stem becomes woody two or three shoots will generally appear instead of the one removed. Propagation by means of top-cuttings is quite easy. The ordinary method of Dracæna propagation also answers well. Good fibrous vegetable soil, with some addition of old mortar, seems to be most suitable. This is a very attractive plant for table decoration and for general indoor use.

Bougainvillea splendens.—This species is a very valuable greenhouse climber, superior in many respects to the old and well-known Bougainvillea glabra. It is of a bushier and more compact habit, and the foliage is a richer and deeper green. The inflorescence, a large, leafy panicle, is larger and more showy than that of B. glabra, with numerous bright crimson bracts and tubular yellowish flowers. The leaves are ovate-lanceolate, acuminate, tapering to a short, broad petiole, and deep green in color. Bougainvilleas do well either in pots or when planted out in a cool greenhouse in a well-drained border in rich loam of open texture. Trained under the rafters or on the wall of a conservatory, they are very floriferous and beautiful. Whether planted out or pot-grown, a partial rest should be given during the winter months. This will ripen the wood and insure a profusion of flowers the following season. B. splendens is easier to propagate than most other species. Cuttings of young, almost ripe shoots will root in about three weeks in a slight bottom-heat.

Cultural Department.

Summer-flowering Plants.

Clerodendron fallax.—This is the best of the shrubby varieties of Clerodendron, and its bright scarlet panicles of flowers are a welcome addition to the stove-house during July and August. C. fallax propagates readily here from soft-wood

cuttings in a bottom-heat of seventy-five degrees and soon grows into a fair-sized plant. The large cordate-ovate leaves are dark green and the plant is erect in habit. A compost of two-thirds loam, one-third leaf-mold, with a dash of sharp sand and a little dried cow-manure well pulverized, seems to suit it. Mealy bug is partial to this plant, for which a well-directed force of water from the hose is the best remedy. Failing a good water-supply, hand-sponging must be adopted. During the winter months the plants should be kept moderately dry at the roots. The end of February is a suitable time to repot them.

Pleroma macranthum.—During July and August, when greenhouse flowers are comparatively few, the beautiful rich violet-purple flowers of Pleroma macranthum, or Lasiandra macranthum, as it is also frequently called, are sure to command attention. Although the individual flowers last but a brief period, the plants continue to bloom for several weeks, and a bushy plant in good flower is a beautiful object, its color being distinct from that of any other indoor plant. The propagation of this species is of the easiest possible nature. Cuttings inserted in a moderate bottom-heat in early spring will be well rooted in about ten days, and if potted on and pinched as required they will make neat plants by flowering time. Pleromas are seldom or never troubled with insect pests.

Allamanda Hendersonii.—This is much the best summer-flowering greenhouse climber; although blooming earlier and more continuously in a stove temperature the flowers lack the size, substance and fine clear yellow color of those grown in a cooler structure. From July until November the plants are smothered with bloom; from November until early in March we give our plants only sufficient water to keep them from shriveling, pruning them back well before starting them into growth. Well-established plants stand liberal feeding, and a mulching of well-rotted manure after scraping away some of the old surface soil will be appreciated. From soft-wood cuttings rubbed off with a heel and inserted in a sharp bottom-heat, Allamandas are readily propagated, and they are not specially fastidious as to compost so long as it is of a generous nature. This season we tried a couple of small specimens planted outdoors in a well-enriched border which gets the sun nearly all day long. The plants have made excellent growth and flowered freely. The flowers are rather more bronzy in hue than when grown under glass, but are equal in size to any greenhouse specimens.

Taunton, Mass. *W. N. Craig.*

Notes on Crinums.

CRINUM PEDUNCULATUM, now in bloom, is a good example of the star-flowered section of these plants. Crinums differ materially, but may be divided broadly into two sections. Firstly, those with columnar leafy bulbs, evergreen leaves, and flowers with narrow strap-shaped petals forming star-like flowers; and, secondly, those with round or ovoid bulbs, leaves deciduous generally and usually drooping flowers, which are somewhat bell-shaped, with broad petals. C. pedunculatum has a bulb a foot or so in length, made up from the bases of the long wide leaves. Like all Crinums, it requires warmth and moisture in the growing season, and flowers usually at this time, the thick peduncle springing from between the leaves and bearing numerous flowers—eighteen or more. These are white, star-shaped, with upright purple stamens, capped with brown anthers, the petals being narrow, channeled and recurved. On the whole, this is a quaintly effective plant.

The species are rather numerous, and while they all have certain merit, Crinums Moorei and Powelli are, beyond doubt, the two most beautiful and valuable. C. Moorei, with its large round bulb, long narrow neck and wide-spreading leaves, is a very striking plant in the garden at any time. It blooms with some regularity, having flowers of a most beautiful shade of pink, of large size and fine form. C. Powelli is a hybrid between C. Capense and C. Moorei, and seems to be hardy here in a sheltered location without other protection, as it has stood out two years. Last winter, being unusually severe, was a good test for uncertain bulbous plants, and finished up C. Capense, which, to my thinking, was not a great loss from the garden. C. Powelli has leaves dark green and some three feet long at this time, the bulb showing only a short neck. Later it will bloom with handsome pink flowers on tall stems. There is also a white-flowered form. With deep, well-worked soil and generous cultivation this forms a noble plant which will prove a treasure and ornament in any garden. The Crinums with striped flowers, of which C. Kirkii is a popular example, do not seem to me entirely satisfactory, the reddish stripes usually being of a dull, unsatisfactory hue. They are easily grown and tenacious of life if kept in a warm dry place in winter.

Elizabeth, N. J. *J. N. Gerard.*

Two Good Kniphofias.

WHEN Kniphofia pauciflora was first described and figured in *The Gardeners' Chronicle* it was stated that it had flowered at the Royal Gardens, Kew, in May and again in September, and that, though it was not so gaudy as many of its race, it would be a welcome plant if its disposition to flower twice a year would be regular. Since the plant has become more plentiful it has, indeed, proved a perpetual-flowering one. Its principal time is April and May, but it comes on again by the end of June, and for a third time in September. It has narrow grassy leaves about a foot long; the flower-stalks, which come two or three from the same plant, reach a height of two feet, and the loose spikes, about six inches long, droop gracefully; the color of the flowers is a bright citron-yellow. K. Natalensis was not thought much of when it made its first appearance. The color of the spikes was greenish red and dull. I have, however, found a few plants among a lot of 500 which had very bright-colored flowers, and which have improved since. The spike and flowers differ distinctly in shape from other species. The spike is loose, very narrow, about one and a half feet long, the flower slightly recurved and scarcely showing the mouth of the corolla. The color is a mixture of brick-red and rose, and is very striking. Both K. pauciflora and K. Natalensis are well worth having.

Baden-Baden. *Max Leichtlin.*

Hardy Perennial Plants.

OUR native purple Cone-flower, Echinacea purpurea, has been pronounced by English authorities as one of the stateliest and most effective composite plants which this country has given to European gardens, and, really, with its profuse and lasting flowers, its strong and vigorous growth, it is always a striking plant in the perennial herbaceous border. There is no reason why it should not be abundantly used, for it grows readily from seed. Its flowers are large; its dark-colored disks are somewhat conical in shape, giving the plant its common name, and the rose-purple rays which droop from it are two inches long.

Another showy native plant which is now in bloom is the Crimson Balm, Monarda didyma, a perennial of erect habit, which reaches a height of three or four feet when it is well grown, and bears bright red flowers. Although not often seen in gardens, this is a familiar wild flower in some of our middle states, where, along the shaded banks of streams, it often covers large areas. Under good cultivation in rich soil it reaches a much larger size than it does in its native habitat, and its Mint-like fragrance and glowing color make it attractive anywhere. Large masses of it are especially striking at this season. Other native species of Monarda, with purplish flowers, like M. fistulosa, or with bracts stained with purple and yellow, like M. punctata, are good plants for the hardy garden, but less striking than the Crimson Balm, which is also known as Bee Balm and Crimson Bergamot.

The perennial Sweet Peas, Lathyrus latifolius, seem to be somewhat neglected now, perhaps because of the popularity of the annual flowering Peas. But, although the perennial species lack fragrance, they are exceedingly valuable plants for cutting, especially the variety Albus, which often carries half a dozen flowers as white as snow on a single stem. The variety Splendens should not be confounded with the beautiful California species, L. splendens, which has never proved happy in eastern gardens. This variety cannot be trusted to come true from seed, but when propagated from cuttings it can be easily reproduced. It resembles in habit the white form, and its flowers are much brighter in color than the ordinary rosy purple ones.

A plant which has proved perfectly hardy with me, although classed in the books among half-hardy perennials, is the so-called Whorl-flower, Morina longifolia, a native of the mountains in Nepaul. The leaves are narrow, deeply cut and armed with thistle-like spines. The tubular flowers are at first white, changing to deep crimson, borne in whorls and forming a long leafy spike. The glistening leaves and the varying color of the flowers give the plant a very distinct appearance, and it will always attract notice, even in a choice collection of hardy perennial plants.

A more modest plant is Micromeria (Melissa) rupestris, a half-shrubby perennial, which, in this climate, dies to the ground every winter, but throws out numerous partially pros-

trate stems in spring, which rise at the extremities and bear many small labiate flowers produced from the axils of the leaves. They are white, with rosy-purple markings on the inner side of the petals, and are borne in succession from July until heavy frost. This Micromeria, with its distinct fragrance and taste of Pennyroyal, is a first-rate plant for the rock-garden. It is propagated by seed or by division of the roots in spring.

Stamford, Conn. *S. A.*

Cucumber, "Cool and Crisp."—This is an excellent variety in every respect. It has been grown for three seasons and shows many qualities that make it valuable. Chief among these is hardiness and vigor of habit, in which it excels the justly popular Early White Spine. The vine is always healthy and strong, and this enables it to bear up against drought, and in a large measure also against stem-boring insects. The fruit is fully as large as that of Long Green, and is much more symmetrical in shape, being slightly curved and tapering gradually at both ends. It contains very few seeds, as few as any variety I have grown, and is most delicate in flavor. In a word, it is much like an English frame cucumber in form and fully equal to it in flavor. Its value as a market variety remains to be tested by experience, as it is not yet generally known, but beyond all doubt it has no rival for the private garden.

Bloomfield, N. J. *W. R. S.*

Correspondence.

The Rose Garden on the Wooded Island, Jackson Park, Chicago.

To the Editor of Garden and Forest:

Sir,—The possibility of growing Roses in Chicago is fully demonstrated this year by the garden of Roses on the Wooded Island. The Roses were nearly all taken up at the close of the World's Fair, and these plants were mostly set out in the spring of 1894 The exceptions are some plants of Rosa rugosa, Moss Roses and Pride of Washington, that form the hedge enclosing the garden. The plants suffered last year from drought, but the water-supply on the Island has been increased and they have been properly watered this season.

Early in the winter of 1894-1895 all of the plants except those of Rosa rugosa and its hybrid, Madame Georges Bruant, Madame Plantier, the Moss Roses and the climbing Rose, Pride of Washington, were pegged down to the ground and well covered with leaves. The exceptions mentioned were protected with the same material at the roots only. The plants wintered, in the main, remarkably well, although the weather was severe. Probably they were helped by the snow that was much of the time spread over their leafy covering. But, as there was no snow on the ground at the time when the mercury reached the lowest point recorded, the hardiness of the Roses may be considered as fairly tested.

The Moss Roses, Madame Plantier and Rosa rugosa wintered perfectly, with no protection save at their roots, but plants of Pride of Washington were killed back to the covering of leaves, which in their case protected the wood trained along the lower of two wires that support the hedge Roses. All of the wood on the upper wire, which is stretched about two and a half feet above the ground, was killed, excepting in one or two places where the hedge is somewhat sheltered by trees and shrubs.

The garden is composed largely of Hybrid Remontants, and of these Mrs. John Laing is easily the best, proving hardy and vigorous and flowering freely. Although its first flowering was somewhat less abundant than that of Marshall P. Wilder, it has bloomed more continuously. As grown here, Marshall P. Wilder is entitled to second place as an all-round Rose. General Jacqueminot is nearly its equal, and Earl of Dufferin and Alfred Colomb are about as good. Following these comes a list of good varieties, all of which have proved satisfactory. They include Jeannie Dickson, Baroness Rothschild, Comtesse De Serenye, Paul Neyron, Anne de Diesbach, John Hopper, La Reine, Caroline d'Arden, Fisher Holmes, Jean Liabaud, Pæonia, Merveille de Lyon, Mabel Morrison and Prince Camille de Rohan. These all wintered safely under a covering of six to eight inches of dry leaves, made good growth when the covering was removed in late spring, and flowered well, many of them profusely, in June. Several varieties, notably Mrs. Laing, General Jacqueminot, Marshall P. Wilder, Earl of Dufferin, Merveille de Lyon, Baroness Rothschild and a few others are giving a good second crop, and other kinds show scattering blooms. No symptoms of mildew are apparent up to July 15th.

The beds are all covered with a heavy mulch of lawn-clippings, but all of the Honeysuckle-vines that were supposed to outline the beds have been removed, for they were found quite unmanageable, overgrowing and smothering the Roses. In fact, these and the rampant Verbenas that filled all of the space about and beneath the Roses last year, smothered to death as many Roses as were winter-killed. For this reason lawn-clippings now replace any living and growing mulch.

The Ramanas Roses have proved entirely hardy. This is also true of the Rugosa hybrid, Madame Georges Bruant, which is in flower continuously. Madame Plantier is also reliably hardy, and gives an immense June crop of flowers. So, too, are the Moss Roses, Comtesse de Murinais and Captain John Ingram having bloomed the best.

In the Perpetual Moss class Salet and Blanche Moreau have proved most satisfactory. Pride of Washington is the best bloomer among the climbing June Roses, but it is not hardy unless all the wood is protected. Clothilde Soupert has almost disappeared from the garden. It is said to have frozen back badly, although turned down and protected. But all of the Polyantha class, as well as other low-growing Roses, were so smothered by the rank growth of Verbenas that they went into winter quarters with impaired vitality. This may in a measure account for the loss of Clothilde Soupert. It did admirably during the summer of the World's Fair, being among the last to succumb to mildew.

Gloire de Dijon, which is the strongest grower among Tea Roses, Reine Marie Henriette and Madame Pigney are the only sorts in this class that can be called hardy here, and then only when protected.

The Roses that have done least well in the Rose garden, and may, therefore, be deemed unsuited to the Chicago climate, are Margaret Dickson, which is the most vigorous of all the Remontants grown, but is parsimonious of its truly lovely flowers, and so is a disappointment. Her Majesty is also a strong grower, but does not flower well; Belle of Normandy is hardy, but does not perfect its flowers; La France froze back badly, but is sending up good shoots for late flowering; François Treyvé is a good grower and hardy, but the buds blight when they begin to open; François Levet is hardy, but many of its buds do not open; and American Beauty freezes back, refuses to grow, and is generally unsatisfactory as an out-of-door Rose in this climate.

Brighton, Ill. *Fanny Copley Seavey.*

Luther Burbank's Hybrid Lilies.

To the Editor of Garden and Forest:

Sir,—The work of Luther Burbank in the improvement of plants and fruits by hybridization, cross-fertilization and selection is well known throughout the horticultural world. His work with Lilies began some eighteen years ago with a form of Lilium pardalinum, one of the native plants of this coast. It grows from British America to southern California, is very hardy, and increases rapidly by new bulbs from its rhizomatous root. It is found from high altitudes to the sea-level, usually in marshes on the banks of streams, or in deep, rich soil, and varies remarkably in size, form and color. In cultivation it takes readily to any garden soil, is very little subject to disease, and as easily grown as potatoes.

Some bulbs, of a form found near the Geysers, were first cultivated and the seed planted. Extreme types of these seedlings were selected and cross-fertilized. The same process was repeated several times. Several years ago I saw a field of Lilies, the result of this crossing, and the variety was wonderful. Every intermediate form could be found, from giants nine feet tall to dwarfs from six inches to a foot in height, while the flowers ranged in color from yellow centres and scarlet tips through orange to light yellow centres with pale red tips. These variations, although valuable in themselves, only formed a base for succeeding work, for when by repeated cross-fertilizations a form begins to break, it is more susceptible to the influence of the pollen of another species.

Using some of these varieties of Lilium pardalinum as pistillate parents, Mr. Burbank crossed upon them the following Lilies: L. auratum, many varieties; L. Battemaniæ, L. Brownii, L. candidum, L. Catesbæi, L. Chalcedonicum, L. elegans, L. Humboldtii L. longiflorum, L. Martagon, L. maritimum, L. Parryi, L. parvum, L. speciosum, L. superbum, L. tigrinum, L. Wallichianum, L. Washingtonianum, L. purpureum. L. Humboldtii and some other Pacific coast Lilies were also used as the pistillate parents for a few thousand crosses.

Four years ago I saw the seed-pans containing these hybrids, then a year from seed. The little plants, numbering four hundred thousand in all, made a wonderful study in leaf variation.

These hybrids flowered last year, and the present season reached maturity. The field of three acres slopes gently to the east, the soil is a light sandy loam; in an air-line the distance to the Pacific Ocean is about twelve miles, and the air is tempered by daily ocean breezes. For moisture only cultivation is needed. In the field about one hundred thousand of the hybrids were in bloom on the fifteenth of June; a small portion had not reached maturity. It is needless to say that a richer mass of yellow, scarlet and gold could not well be imagined. Nearly all, unlike Lilium pardalinum, were fragrant.

Among so large a number of hybrids with so many violent crosses, freaks and monstrosities were to be expected, but, outside of a few exceptions, it can be said that all are symmetrical in form and beautiful in coloring. In form the range is from the closely recurved form of the typical L. pardalinum to a very flat flower, in which the petals approach the horizontal, a form which, so far as I know, was heretofore unknown among Lilies, and most nearly approached by L. candidum and L. tigrinum. Then there are many running into the trumpet forms, but none with the long trumpets of the L. longiflorum type.

In color the flowers range from the usual yellow or orange centre and scarlet tip of Lilium pardalinum to dark red on one hand and rich orange red, lemon, and a few white and pale lemon or straw-colored flowers on the other. Nearly all are spotted or dotted, many faintly, and some are clear lemon-yellow. The traces of all the staminate parents can be seen in the leaves and in the bulbs. My own examination and Mr. Burbank's information is that the result is equally various. In one particular it is especially notable and valuable. Mr. Burbank, I need hardly say, is a careful and successful grower, yet with very many of the Lily species he has the sort of success so many of us are too well used to. His bulbs dwindle away or suffer from disease until a few bulbs are all that are left to represent a plantation of hundreds. The hybrids, however, have inherited the strong constitution of L. pardalinum and its freedom from disease. In most cases, also, they inherit its tendency to rapid propagation. I also noted that hybrids of L. Parryi and L. Humboldtii show a vigor which neither parent possesses.

There is another and, doubtless, very potent reason for their vigor. In Mr. Burbank's work with Lilies the doctrine of the survival of the fittest has been carried out to an unusual extent. About two million seedlings have been grown altogether; in this last lot a hundred thousand are left out of four hundred thousand. There must certainly have been a pretty thorough elimination of the less vigorous seedlings. A healthier lot than the survivors would be hard to find.

In fragrance the seedlings rather follow the fragrant staminate parents than the odorless Lilium pardalinum. Practically all are fragrant, many exquisitely so. With a favorable wind the odor from these great Lily-fields can be perceived at a distance of five miles. To describe all of the variations to be found in this wonderful field would be impossible; to describe even the striking ones would require a volume, since scarcely any pair of plants are alike, and a thousand forms as distinct as named Gladiolus could be selected.

All are extremely floriferous, thirty to fifty flowers to a plant being common, and a few having over a hundred. One of the most curious forms was one in which Lilium pardalinum, var. minor, had been crossed with an unknown species. This might be called a Tree Lily. The bulb threw up many stalks. One of these branched about a foot from the ground into eight branches. The largest branch had forty-three blossoms, while the bulb bore two hundred and seven—this at six years from seed. An equally wonderful plant is a cross between L. pardalinum and L. Wallacei, which, at the same age, had thirty-seven stalks flowering. Many plants clearly show the influence of L. elegans in the very dark red flowers, and in the leaves of others can be seen the blood of L. giganteum. Crosses between L. pardalinum, var. minor, and L. maritimum are remarkable for vigor and very numerous fine flowers.

The cross on Lilium pardalinum gives a vigorous constitution, and with such vigorous hybrids of nearly every type Lilies must soon become the flowers of the people.

Ukiah, Calif. *Carl Purdy.*

Iris hexagona.

To the Editor of GARDEN AND FOREST:

Sir,—Mr. Gerard's interesting article on American Irises in GARDEN AND FOREST of July 17th, suggests a word on I. hexagona in its natural habitat.

In *Gray's Manual* of 1890, Iris hexagona is given only in the appendix. I judge from that that it is a comparatively rare plant. It is not plentiful here, and I have met with it in a wild state not above a half dozen times in twice as many years. This is the more singular, as under cultivation it is exceedingly robust and thrifty—single rhizomes set out eight years ago in garden soil, and twice subdivided since then, having grown into matted clumps four feet across. Grown in masses it is decidedly a showy plant, the color is so clear and bright, and the flowers so freely borne. All of our plants of this Iris have been grown in ordinary garden loam, in quite the reverse of wet soil, and have never been watered. Contrary to the usual belief, they have grown as well as in swampy land, and have endured several droughts uninjured.

Apparently this is a most variable species. We have in our collection of these plants three well-defined varieties. The one that most nearly answers to the type described by Gray is the most robust of all, and somewhat later to bloom. The flowers of this are large and showy, much larger than the second form of I. hexagona that came into my possession, a full shade darker, and the markings brighter and deeper. The third form, that Mr. Gerard has done me the honor to name I. hexagona, var. La Mance, is by far the best of the three. It is the earliest of all to bloom, and the large, wide-spreading flowers are from a third to a half larger than the flowers of the other two forms of the species in the same bed, and with the same treatment. The color is remarkably fresh and clear, a deep, rich blue, with darker shadings and white markings. A touch of yellow further enhances the general brightness. This plant was discovered last year in Benton County, Arkansas, just across the state line of Missouri. A semicircle of wild hills, half bluff, half woodland, was its home. Climbing from rocky step to step, we had clambered up from the valley below. Half-way up the mountain side ran a broad, heavy ledge of rock, and in a pocket-like dip of this ledge, so shallow that there was not more than six inches of earth above the naked limestone, were growing two dwarf, but thrifty-looking Irises. They were not in flower, but the situation was such a singular one for an Iris that we dug up all we could find, hoping it would prove to be a new species. Half of our little find we sent to Mr. Gerard for identification, and the other portion planted out in our own border. No special attention was given to it, and we were quite surprised at its remarkable size and beauty when it bloomed.

Pineville, Mo. *Lora S. La Mance.*

Recent Publications.

In a Gloucestershire Garden. By Henry N. Ellacombe, M.A. London: Edward Arnold.

Every one who reads the current horticultural literature of England is familiar with the writings of Canon Ellacombe. The present volume consists mainly of articles which were prepared originally for *The Guardian*, although they have been somewhat modified in their permanent form. The first part of the volume is a garden calendar, each of its twelve chapters being devoted to the flowers of one of the months of the year, and there are fourteen other chapters on various garden subjects, such as Spring Flowers, Climbing Plants, Garden Walls, Palms and Bamboos, Parsonage Gardens and the like. Canon Ellacombe lacks neither imagination nor profound affection for his plants, and yet his writings never degenerate into sentimentalism. He has actual and accurate knowledge gained from close personal investigation, and this means not only the ordinary knowledge of the horticulturist and botanist, but that intimate acquaintance with all the ways and habits of plants which is only gained by one who takes a constant and affectionate interest in them in all stages of their growth. The purpose of the book is not primarily didactic, but as the story flows pleasantly on a great deal of genuine practical information is conveyed, along with many gleanings from rare old volumes that have a value purely literary or historical. Although the record is one of an English garden, the principles enforced are sound for all countries and climates, and the American reader will find it not only pleasant reading for midsummer days, but helpful and suggestive when he is studying what to do and what to refrain from doing in his own garden.

It ought to be added that the mechanical part of the book, its style of type, its illustrations and press-work are all of the very best quality.

Notes.

According to the *Journal of Commerce*, the first new evaporated apples from the south are already on the market, and also some small lots of southern sun-dried apples. New dried huckleberries are offered, to arrive, at nine and a half and ten cents a pound.

It is many years since sweet corn has been so uniformly good and free from worms as this season. Well-grown, evenly grained ears sell for twenty cents a dozen. Sweet Spanish peppers and Knob celery (Celeriac) are among new vegetables now coming from this section, and considerable quantities of asparagus still find sale along with more seasonable products, at twenty-five cents a bunch.

We have often called attention to the Spiked Loosestrife, Lythrum Salicaria, a plant which has become so thoroughly naturalized in damp places throughout all the north-eastern United States that most persons consider it a native. The plant has a tendency to vary, and some strains are superior to others, but the tall spikes of dark purple flowers, from four to six feet high, are always effective, especially on the borders of water, still or flowing, or where they can have a background of foliage. In parks and private grounds of suitable extent they are very useful and among the most striking of late summer-flowering plants.

The Geneva Experiment Station offers to distribute to persons in this state buds of the Lutovka Cherry, which was imported some twelve years ago by Professor Budd, of Iowa. The tree is of the Morello type, with firm fruit, of a sprightly acid flavor, about the size of an English Morello cherry, similar in size to that fruit, but with flesh not as dark. Professor Budd says that this Cherry is grown largely in Poland and Silesia as a roadside tree. It has been grown in Geneva for seven or eight years, and has proved very productive of fruit, which ripens as late or later than the English Morello. It has been grown to some extent in the west, and seems to be worthy of extended trial as a late sour cherry.

It has been for a long time held that chemical analysis of soils gives very little practical information as to their value. Dr. E. W. Hilgard, however, believes that it is time to abandon the denunciation of the so-called mistakes of Liebig, since his views are now being justified one after another, with the exception of his under-estimation of the need of nitrogenous fertilizers. Writing for the *American Agriculturist*, Dr. Hilgard says that a study of virgin soils has convinced him that certain characteristics ascertainable by analysis invariably translate themselves by definite effects upon natural and cultivated vegetation. The tendency of modern research is to the effect that cultural results run so closely parallel with those of analysis, that the results of the experiments with different fertilizers can be predicted from a proper understanding of the analysis.

According to the *Agricultural Gazette* of New South Wales, the true Opium Poppy can be easily and successfully grown in that country, where, in favorable seasons, the plant will flower in about fifteen weeks from the time of planting. As soon as the flower falls the capsule is slightly cut across one side in the afternoon to let out the milky juice. About four wounds are made. The next morning the milky juice will have hardened into a thin gum, which is scraped off with a blunt knife and transferred from the knife into a clean tin vessel. The unwounded side of the capsule is operated on the following afternoon. The collected gum or opium is made into thin cakes and carefully dried in the shade. The work of opium collection is one which can be done by careful women and children. When nothing but the seeds or heads are required the Poppy is planted broadcast and hoed out or thinned to a distance of nine inches apart. About 40,000 heads can be gathered to the acre, and when dried they are worth about five dollars a thousand. The seed is rich in oil, very nutritious, with an almond flavor, and is good food for consumptives. It brings twenty-five cents an ounce in Sydney.

The tornado which swept through Bergen County, New Jersey, three weeks ago did great injury to the well-known experiment-grounds of Mr. Carman, editor of *The Rural New Yorker*, and every one will sympathize with the feeling of loss and desolation which is expressed in his description of the ruin so suddenly wrought among the beautiful groves and woods that made this rolling country so attractive. "We walk over to Emwood, our experiment-field," he writes, "and look about as one in a dream. We have note-book in hand, as in previous seasons, but there are no notes to take. They have all been taken. The grove of Oaks, Chestnuts, Beeches, Maples, Birches and Tulip-trees, with its undergrowth of thousands of natural flowers and more than a thousand introduced shrubs and hardy herbaceous plants, so enjoyable and restful during the heat of the day, is now a mass of broken and splintered timber, kindling wood, huge roots, sections of trees that could not have been rendered more suggestive of havoc and ruin if they had been thrice struck by lightning." It is twenty-three years since Mr. Carman built his house and laid out the Rural grounds, and it is natural that he should feel attached to the place and to the surrounding country by many endearing associations. But the tornado has so changed everything that he declares it almost impossible for him to realize that it is the same country and the same home.

Seedling oranges continue to come from California by the car-load. Some fancy St. Michaels and Mediterranean Sweets from that state last week brought as much as $3.70 to $3.85 a box at the wholesale auctions, and the highest price reached by Rodi fruit, the popular summer Mediterranean orange, was $2.60. With the end of the Mediterranean shipments of lemons at hand, fancy Majori fruit sold for $6.75 a box last week, and anticipated advances may reach the extreme prices of a year ago when Rodi lemons sold here for $7.62½. California fruit during the early part of the season sold so low as hardly to cover freightage, and a larger proportion of the fruit is now being kept at home to be dried and canned and made into wine. Sixty-five car-loads of California pears, plums and peaches were sold here last week, including also a few nectarines, early grapes and Seckel pears. The Georgia peach season is now past, and with the short supply from California, and the Delaware and New Jersey crops not yet marketable, those from North Carolina have brought exceptionally high prices. Baskets containing less than two dozen good Elbertas, on Monday, commanded $1.00. The scarcity of this fruit from nearby states has also made a temporary rise in prices of Pacific coast peaches, the best of which now bring $1.50 for a box six times the size of the Carolina package. Among the large variety of plums, Fellenberg, known also as the Large German, Swiss or Italian prune, is distinct and attractive. The form is oval and pointed and the color dark purple, enriched with abundant dark blue bloom. Another showy prune now frequently seen is the so-called Gros prune (Grosse Prune d'Agen, English Pond's Seedling or Hungarian prune). This fruit is very large, of a reddish violet color and suffused with bloom. Crab apples, large and showy, cost fifty cents for a ten-pound basket.

The *Boston Park Guide* is a compactly printed pamphlet of some seventy pages, with a full series of official maps and plans and a score or more of full-page illustrations, representative landscapes and structures in different portions of the park system. The work has been prepared by Mr. Sylvester Baxter, who was secretary of the preliminary Metropolitan Park Commission, and it includes not only a description of the parks of the central city, but those of the suburban municipalities which make up the metropolitan district, known as the Greater Boston. The entire area of these public reservations amounts to rather more than 14,000 acres. Few cities excel Boston in the beauty and variety of the landscapes which surround it, and perhaps no city in the world has taken such wise and comprehensive action to preserve so much of the characteristic scenery about it for the recreative requirements of its coming population. No one is more competent to write intelligently on this subject than Mr. Baxter, and he has rendered a service, not only to every one who proposes to visit the parks of Boston, but to all who take any interest in the question of providing pleasure-grounds adequate to the needs of our growing cities. This little monograph sets forth so graphically the different uses and purposes to which the various parks, small and great, are adapted; it describes so clearly the vital connections which unify the whole into a single organic system; it points out so accurately the controlling motives of the designs of the various divisions, both from an artistic and a practical point of view, that it will be useful to readers everywhere, and will be one more influence to help in the creation of a sound public opinion in favor of ample park spaces for our cities. Incidentally and inferentially this little book plainly points out the necessity of securing a master of design when any park or system of parks is to be planned. Any one who reads and appreciates what has been accomplished for Boston by the study of a true artist, will realize what Boston would have lost and what any other city will lose when such work is entrusted to some journeyman. The book is published by the author at 255 Washington Street, Boston, and is sold for twenty-five cents a copy.